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EXAMINER

LEURIG, SHARLENE L

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 06/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/857,698

Applicant(s)

BERGER ET AL.

Examiner

Sharlene Leurig

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27, 30 and 32-35 is/are rejected.
- 7) ☒ Claim(s) 28, 29 and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 31 recites the limitation "the through paths" in line 2. There is insufficient antecedent basis for this limitation in the claim. The limitation of through paths formed in the reflective structure is contained in claim 28. Claim 31 is dependent on claim 30, which is dependent on claim 26, which does not contain the limitation of through paths formed in the reflective structure.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-14, 16-17, 20-23, 25-26, 30 and 32-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. (JP 08-008065) (of record).

Regarding claim 1, Ito discloses a light-emissive device comprising a light emissive region (Figure 2, element 3o), a first electrode (2) located on a viewing side of the light-emissive region for injecting charge carriers of a first type, a second electrode (4) located on a non-viewing side of the light-emissive region for injecting charge carriers of a second type, and a reflectivity-influencing structure (4a) located on the non-

viewing side of the light-emissive region and including a light absorbent layer comprising an oxide of a low work function metal (paragraph 0019).

Regarding claim 2, the first electrode is translucent and therefore partially light-transmissive (Abstract Constitution, lines 2-3).

Regarding claim 3, the reflectivity-influencing structure (4a) is located on the opposite side of the second electrode (4c) from the light-emissive region (3o), where the conductive layer 4c is interpreted as being the second electrode.

Regarding claim 4, the second electrode (4c) must be at least partially light transmissive since it is positioned between the light-emissive region (3o) and the reflectivity-influencing structure (4a).

Regarding claim 5, the thickness of the second electrode (4c) is less than 30 nanometers, since the disclosed thickness is 20 nm (paragraph 0024).

Regarding claim 6, the reflectivity-influencing structure (4a) is adjacent the second electrode (both 4c and 4b).

Regarding claim 7, the second electrode provides the reflectivity-influencing structure. It refers to the structure (4) as the back electrode and the reflectivity-influencing structure as the light-absorbent "electrode layer 4a" (paragraph 0017).

Regarding claim 8, the second electrode (4c), described as a "low work function layer" (paragraph 0025) comprises an oxide of a low work function metal such as BaO or CaO (paragraph 0024).

Regarding claim 9, the second electrode comprises aluminum (paragraph 0022).

Regarding claim 10, the reflectivity-influencing structure (4a) is effective to absorb light emitted from the light-emissive region that reaches it through the second electrode (4c) since the reflectivity-influencing structure (4a) is designed to absorb up to 90% of the light emitted from the light-emitting region that passes through the electrode (4c) (paragraph 0026).

Regarding claim 11, the reflectivity-influencing structure (4a) adjacent the second electrode (4b and 4c) renders the second electrode substantially non-reflective to light emitted from the light-emissive region since the reflectivity factor of the second electrode (4b and 4c) is meant to be decreased (paragraph 0018).

Regarding claims 12 and 32, the second electrode (4b) comprises an electrically-conductive material, such as aluminum (paragraph 0022).

Regarding claims 13, 22 and 33, the light-emissive layer comprises an organic light-emissive material such as an organic phosphor (paragraph 0001).

Regarding claims 14, 23 and 34, the light-emissive layer comprises a polymer light-emissive material (paragraph 0041).

Regarding claims 16 and 25, the reflection-influencing layer is electrically conductive (paragraph 0012).

Regarding claim 17, Ito discloses a light-emissive device comprising a light emissive region (Figure 2, element 3o), a first electrode (2) located on a viewing side of the light-emissive region for injecting charge carriers of a first type, a second electrode (4) located on a non-viewing side of the light-emissive region for injecting charge carriers of a second type, and a reflectivity-influencing structure including a light-

reflective layer (4b) and a light-transmissive spacing layer (4a) between the second electrode (4c) and the light-reflective layer, the thickness of the spacing layer being such as to space a reflective plane of the light-reflective layer by approximately half the wavelength of the optical mode of the device from part of the light-emissive region (paragraph 0026).

Regarding claim 20, the plane of the light-reflective layer (4b) located at approximately one-half the wavelength of the optical mode of the device from the light-emissive region (3o) is the major surface of the light-reflective layer that is closer to the light-emissive region. It describes the major reflecting surface of the light-reflective layer (4b) as the "front face", meaning the face closest to the front display substrate and therefore the face closer to the light-emissive region (3o), which is between the front display substrate (1) and the light-reflective layer (4b).

Regarding claim 21, the second electrode (4c) comprises an electrically-conductive material, such as alloys of aluminum, silver, and gold (paragraph 0024).

Regarding claim 26, It discloses a light-emissive device comprising a light emissive region (Figure 2, element 3o), a first electrode (2) located on a viewing side of the light-emissive region for injecting charge carriers of a first type, a second electrode (4) located on a non-viewing side of the light-emissive region for injecting charge carriers of a second type, and a contrast-enhancing structure (4) located on the non-viewing side of the light-emissive region and including a reflective structure (4b) having different reflectivity for different wavelengths of incident light, and having a reflectivity peak encompassing an emission wavelength of the light-emissive region, the reflective

structure having a high reflection factor for the light emitted by the light-emitting region, "especially the light of the dominant wavelength" (paragraph 0026).

Regarding claim 30, the cathode (4) comprises a transparent layer (4a) located between the reflective structure (4b) and the light-emissive region (3o) (paragraph 0028).

3. Claims 26 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Kato et al. (EP 0 430 041 A1) (of record).

Regarding claim 26, Kato discloses a light-emissive device comprising a light emissive region (Figure 2, element 20), a first electrode (28) located on a viewing side of the light-emissive region for injecting charge carriers of a first type, a second electrode (26) located on a non-viewing side of the light-emissive region for injecting charge carriers of a second type, and a contrast-enhancing structure (16) located on the non-viewing side of the light-emissive region. The contrast-enhancing structure includes a reflective structure having different reflectivity for different wavelengths of incident light, since it comprises three different reflective areas (30, 32 and 34), all of which reflect light of different wavelengths (column 5, lines 18-54). The reflective structure has a reflectivity peak, 895 nm for reflective layer 30, 860 nm for reflective layer 32 and 968 nm for reflective layer 34 (column 5, lines 18-54), encompassing an emission wavelength of the light-emissive region, which is 880 nm (column 6, lines 30-32) (column 8, lines 4-8).

Regarding claim 27, the reflective structure is a distributed Bragg reflector, and is described as being a "wave interference type reflector" (column 7, lines 54-55).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 15, 24 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 08-008065) (of record) in view of Hosokawa (JP 08-222374) (of record).

Ito discloses a light-emitting device with all the limitations discussed above, including a light-emitting layer comprising a polymer material, but lacks a light-emitting material made of a conjugated polymer material.

Hosokawa teaches a variety of common luminescent substances for use in an organic light-emitting device, including conjugated polymer materials such as poly-alkyl fluorene (paragraph 0016).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ito's light-emitting device with a light-emitting layer made of a conjugated polymer material, since conjugated light-emitting polymers have been shown to be well-known in the art by Hosokawa.

6. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (JP 08-008065) (of record) in view of Dodabalapur et al. (5,674,636) (of record).

Ito discloses a light-emitting device with all the limitations discussed above, including a light-reflecting layer spaced from a light-emissive region (30) by a distance corresponding to one-half wavelength of the optical mode of the device, but lacks explicit disclosure of electron/hole recombination in the light-emissive region. Ito further discloses

Dodabalapur teaches electron/hole recombination in an electroluminescent layer (column 3, lines 60-61).

Regarding claim 18, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ito's light-emitting device so that the part of the light-emitting layer that is spaced a distance corresponding to one-half wavelength of the optical mode of the device from the light-reflecting layer is the part of the light-emitting layer where a significant amount of electron/hole recombination is occurring and hence where the majority of light is being emitted so as to enable the reflectivity-influencing layer to absorb the most light, and thereby providing the optimum amount of contrast between the front and back of the device in order to improve the visual display.

Regarding claim 19, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ito's light-emitting device so that the part of the light-emitting layer that is spaced a distance corresponding to one-half wavelength of the optical mode of the device from the light-reflecting layer is the principal region of

electron/hole recombination and hence where the majority of light is being emitted so as to enable the reflectivity-influencing layer to absorb the most light, and thereby providing the optimum amount of contrast between the front and back of the device in order to improve the visual display.

Allowable Subject Matter

7. Claims 28 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: The Examiner notes that the Prior Art of Record fails to teach or suggest the combination of limitations as set forth in claim 28, and specifically comprising the limitation of the second electrode comprising a layer with a plurality of through-paths passing through the reflective structure for electrical conduction between the second electrode and the light-emissive region, where the reflective structure has the limitations of claim 26, namely having a different reflectivity for different wavelengths of incident light and a reflectivity peak encompassing an emission wavelength of the light-emissive region.

9. Claim 31 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The Examiner notes that the Prior Art of Record fails to teach or suggest the combination of limitations as set forth in claim 28, and specifically comprising the limitation of the second electrode comprising a layer with a plurality of through-paths passing through the reflective structure for electrical conduction between the second electrode and the light-emissive region, where the reflective structure has the limitations of claim 26, namely having a different reflectivity for different wavelengths of incident light and a reflectivity peak encompassing an emission wavelength of the light-emissive region.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (703)305-4745. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703)305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

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Sharlene Leurig
June 4, 2003



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